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Internal wave behaviour in the submarine canyons of the Celtic Sea Shelf

Tahmeena Aslam (1), Rob Hall (1), Karen Heywood (1), Stephen Dye (1,2)

(1) University of East Anglia, United Kingdom, (2) Centre for Environment, Fisheries and Aquaculture Science (Cefas), United Kingdom

The Celtic Sea, located off the south coast of Ireland, is a 100-200m deep shelf sea that is notable for the presence of large tidal currents and strong seasonal fluctuations in surface heating and cooling. The shelf edge is a region of rough topography and barotropic tidal flows generate internal waves and associated baroclinic energy fluxes. These internal tides are reflected if they encounter topographic features. The reflection is dependent on the relative topographic slope and can be subcritical (waves continue to shoal), supercritical (waves are reflected back into deep water) or critical (nonlinear effects, potential wave breaking and turbulent mixing). Submarine canyons are a common bathymetric feature along the Celtic Sea shelf edge and are known to trap and focus internal waves towards the head of the canyon, leading to high levels of turbulent mixing. This mixing may drive vertical nutrient fluxes and enhance primary productivity at the shelf edge. Celtic Sea submarine canyons are typically dendritic and vary in cross sectional profile along the length of their axis, providing many different topographic slope values. Using a numerical model, I will investigate the propagation of internal waves through both idealised canyons and realistic canyon bathymetry from the Celtic Sea shelf edge. Using the results I will attempt to parameterise submarine canyon morphology based on its effect on the internal wave field.